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The Role of Information and Communication Technology (ICT) in Advancing Smart Living: A Systematic Literature Review

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ABSTRACT

The rapid growth of Information and Communication Technology (ICT) has given rise to the Smart Living paradigm, which integrates digital devices, services, and infrastructure to enhance the living standard. Using the PRISMA framework and a Systematic Literature Review (SLR) technique, this study aims to identify how ICT supports smart living. Literature searches were conducted on six reputable international databases (ScienceDirect, IEEE Xplore, Emerald Insight, SpringerLink, Wiley Online Library, and Taylor & Francis Online) with publications ranging from 2020 to 2025. From 1,580 articles, a gradual screening process yielded 30 relevant articles for analysis. The synthesis results show that the artificial intelligence (AI) and Internet of Things (IoT) are the dominant technologies in supporting automation, energy management, digital health services, and community participation. The implementation of ICT has a positive impact on improving quality of life, energy efficiency, new business models, and environmental sustainability. However, challenges such as data privacy, the digital divide, and implementation costs still need attention. This study maps technology trends and innovation opportunities for the development of an inclusive and sustainable Smart Living ecosystem. This review contributes an ICT-centric technology-to-impact mapping for Smart Living and highlights actionable research gaps for inclusive and sustainable implementation.

INTRODUCTION

The rapid growth of digital technology has changed the way humans connect with their environment, giving rise to the concept of smart living as an integral part of modern life (Nikki Han & Kim, 2021). Smart living is one component of Smart City (Govada, 2020). Smart Living is not just about smart homes or connected devices, but a new paradigm that integrates technology to create a more comfortable, safe, efficient, and sustainable living ecosystem. In this context, Information and Communication Technology (ICT) serves as the backbone enabling the creation of innovative solutions to meet increasingly complex living needs (Tcholtchev & Schieferdecker, 2021). The 4th Industrial Revolution and the massive adoption of digital technology have driven the emergence of various innovations supporting Smart Living. The application of ICT in the context of Smart Living spans various sectors, including healthcare, food and beverages, education, energy, and communities.

In the health sector, the implementation of telemedicine and wearable devices enables real-time health monitoring. In the food and beverage sector, the implementation of online food

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delivery platforms can improve the quality of life for citizens by saving time when buying food and beverages (Sabilaturrizqi & Subriadi, 2024). In education, smart learning environments offer adaptive and personalized learning experiences. The energy sector is seeing the emergence of smart grids and IoT-based energy management for consumption optimization (Tcholtchev & Schieferdecker, 2021). Even at the community level, the concept of smart neighborhoods is beginning to be developed by utilizing technology to improve security, togetherness, and citizens' quality of life.

Because smart living contributes significantly to improving the quality of citizens' living, many recent studies have explored the role of ICT in supporting this concept. Although there has been much research on the adoption of ICT in the Smart Living concept, most of it is still fragmented. In other words, the transformation towards Smart Living is not going smoothly. There are complex challenges that need to be overcome, ranging from fragmented technology standards and cybersecurity vulnerabilities to digital divides and resistance to change from some members of society (Balfaqih & Alharbi, 2022). Data privacy issues are also a serious concern, given the large number of devices that continue to collect personal information(Saura et al., 2021). In addition, infrastructure limitations in some areas and high implementation costs often hinder the widespread adoption of this technology(Tcholtchev & Schieferdecker, 2021).

This systematic literature study was conducted to comprehensively examine the role of ICT in realizing Smart Living. The study will focus on three main aspects: first, the contribution of ICT in shaping the Smart Living ecosystem; second, the key technologies that drive it; and third, the real impact on the community's quality of life. This study is important not only to map current developments but also to find areas for future innovation and research gaps. Accordingly, it is necessary to systematically review the literature to understand the role of ICT in realizing Smart Living. The literature selection process was conducted rigorously, taking into account the credibility of the sources and the relevance of the topics. Leading academic databases were the main references to ensure the quality of the study materials.

The findings of this study are expected to have academic and practical implications. For academics, these findings can serve as a basis for further research. For practitioners and technology developers, this study offers insights into trends and best practices. Meanwhile, the findings of this study can be taken into account by legislators when creating rules that support the development of inclusive and sustainable smart living. Based on the objectives described above, this study seeks to answer the following questions:

1. How does ICT contribute to the development and management of Smart Living?
2. What ICT-based technologies are most effective in supporting the implementation of Smart Living?
3. What kind of impact does the adoption of ICT have on social, economic, and environmental aspects in the context of Smart Living?

Therefore, this study aims to systematically consolidate and clarify fragmented findings on smart living by conducting a PRISMA-based systematic literature review on ICT-driven smart living research. The objectives are to (1) map the roles and mechanisms of ICT in shaping smart living development and governance (RQ1); (2) categorize and highlight the dominant enabling technologies and their application areas (RQ2); and (3) evaluate the multidimensional impacts of ICT adoption on quality of life and sustainability, while outlining persistent barriers (e.g., privacy, security, access inequality, and costs) (RQ3). The synthesis of publications from 2020–2025 across six reputable databases is expected to deliver a structured evidence base that supports researchers, practitioners, and policymakers in designing inclusive and sustainable smart living initiatives.

In contrast to prior studies that often discuss smart living as a derivative of smart city development or emphasize citizen adoption and high-level sustainability challenges (Nikki Han & Kim, 2021) (Tcholtchev & Schieferdecker, 2021), this study provides an updated and ICT-centric synthesis focused specifically on Smart Living. By systematically consolidating empirical evidence from 2020–2025 across six major databases using a PRISMA-guided workflow, this review

contributes (i) a structured mapping of how ICT mechanisms enable Smart Living governance and services, (ii) a categorization of dominant enabling technologies (notably AI and IoT) and their application areas, and (iii) an integrated assessment of social, economic, and environmental impacts alongside persistent barriers (e.g., privacy, security, access inequality, and cost). Therefore, this SLR extends earlier works by offering a more comprehensive technology-to-impact perspective and by highlighting concrete research gaps and innovation opportunities for inclusive and sustainable Smart Living ecosystems.

RESEARCH METHODS

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework is used in this study to enhance the reporting quality and transparency of the article selection process. PRISMA is an international guideline that is widely used in the implementation and reporting of *Systematic Literature Reviews* (SLR) and meta-analyses, developed to minimize bias in literature selection and strengthen the reproducibility of research. This paper is divided into 4 sections. The introduction is explained in Section 1, the methodology is explained in Section 2, the results and discussion are explained in Section 3, and the conclusion is explained in Section 4.

Eligibility Criteria

The following are the inclusion criteria (IC) for this review:

IC1: Empirical research that has undergone peer review and is written in English.

IC2: Research discussing the application of ICT in the context of Smart Living.

This review only selects articles written in English (IC1) because English is widely used by researchers around the world. Furthermore, IC2 is used to answer research questions.

This review covers various aspects of Smart Living, such as health, energy, security, comfort, or sustainability. All selected articles were thoroughly screened, first by looking at the inclusion criteria.

Information Sources

A systematic literature search was conducted in various internationally reputable academic databases, namely IEEE Xplore (https://ieeexplore.ieee.org/), ScienceDirect (https://www.sciencedirect.com/), Emerald Insight (https://www.emerald.com/insight/), SpringerLink (https://link.springer.com/), Wiley Online Library (https://onlinelibrary.wiley.com/), and Taylor & Francis Online (https://www.tandfonline.com/). Articles that the authors were unable to fully access were eliminated.

Study Selection

The search strategy was designed by combining three keyword blocks aligned with the research questions: (1) the context (Smart Living), (2) ICT/enabling technologies, and (3) contribution/impact/governance outcomes. Searches were conducted in six databases (IEEE Xplore, ScienceDirect, Emerald Insight, SpringerLink, Wiley Online Library, and Taylor & Francis Online). The final search was limited to 2020–2025, the English language, and peer-reviewed publications. The search string used was ("smart living" OR "smart home" OR "smart housing" OR "intelligent home" OR "connected living") AND ("ICT" OR "information and communication technology" OR "digital technology" OR "internet of things" OR "IoT" OR "artificial intelligence" OR "AI" OR "machine learning") AND (governance OR management OR adoption OR implementation OR impact OR sustainability OR energy OR healthcare OR security OR privacy).

There were three stages in the study selection process, namely: (1) title and abstract screening, (2) full-text assessment, and (3) eligibility verification based on inclusion criteria. To ensure relevant and comprehensive literature coverage, a combination of keywords tailored to the research topic was used, including "IoT for Smart Living", "Artificial Intelligence in Smart Home", "Digital technologies for sustainable living", and "Smart Living environment challenges."

Only articles published between 2020 and 2025 were included in the search to ensure relevance to the latest technological developments. In addition, only articles indexed by Scopus and that had undergone peer review were considered in the selection process to ensure academic quality and credibility.

Based on the eligibility criteria, the titles, abstracts, and keywords of the identified articles were explored and screened. Articles that were not eliminated in the previous stage were read in whole or in part to determine whether they were suitable for inclusion in the review.

To ensure methodological rigor and reproducibility, this study applied the PRISMA workflow as follows:

1) Identification — collecting records from six databases using predefined keyword strings;
2) Screening — eliminating unnecessary titles and abstracts as well as duplication;
3) Eligibility — assessing full-text papers against inclusion/exclusion criteria; and
4) Synthesis — extracting data, categorizing findings by research questions, and summarizing key patterns.

These four stages were carried out systematically to guarantee the selection of essential high-quality studies was in line with the research objectives. Starting with a literature search based on predetermined keyword strings, the process continued with initial selection through abstracts and titles, followed by a full review of the articles. This approach followed the PRISMA framework to provide replicability and transparency in the study selection process. The application of PRISMA helps to ensure that the selected articles are not only relevant and up-to-date (2020–2025), but also come from quality sources (indexed in Scopus or Web of Science and have undergone a peer-review process). In addition, the use of PRISMA strengthens the internal and external validity of the study results, making them more credible as a basis for scientific and practical decision-making (Salameh et al., 2020).

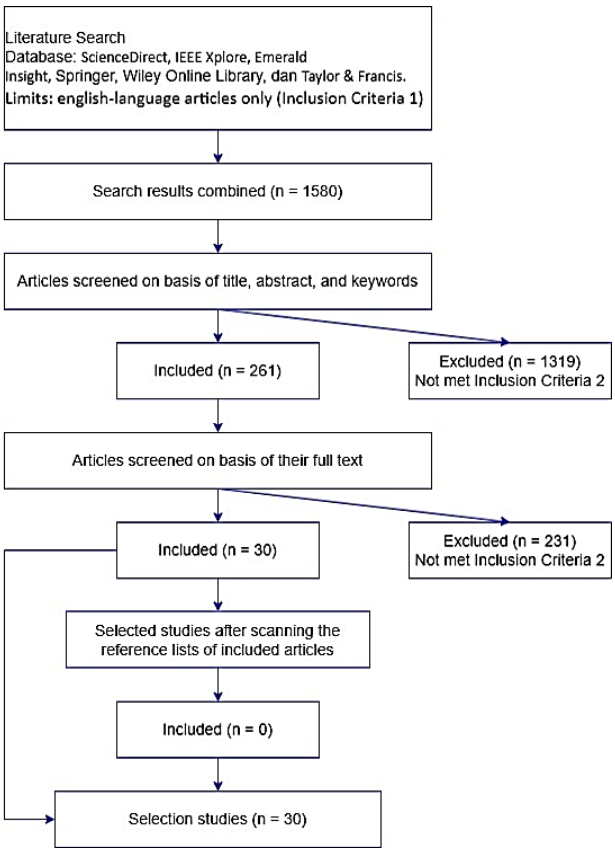

Figure 1. PRISMA Flow Diagram

A systematic search of six academic databases initially yielded 1,580 records. After removing duplicates, which were not necessary at this stage, all records were screened based on title, abstract, and keywords. As shown in the figure above, this process resulted in the exclusion of 1,319 records, leaving 261 articles for full-text eligibility assessment.

At the full-text review stage, 231 articles were excluded because they did not meet the inclusion criteria. The following were the most frequent causes of exclusion: studies that did not focus on smart living or ICT-related applications (n = 94), non-empirical research such as opinion articles or conceptual discussions (n = 57), publications outside the 2020–2025 timeframe (n = 38), full texts that were inaccessible (n = 22), publications in non-English languages (n = 12), and duplicate or overlapping datasets (n = 8).

After this rigorous screening process, a total of 30 papers, in all, satisfied all eligibility requirements and were added to the final qualitative synthesis. This stepwise selection ensured that only high-quality, relevant, and recent studies formed the evidence base for answering the research questions posed.

Quality Appraisal

To strengthen the validity of the qualitative synthesis, the methodological quality of each included primary study was appraised using the Mixed Methods Appraisal Tool (MMAT), version 2018. The MMAT was selected because the included evidence base comprises heterogeneous empirical designs (qualitative, quantitative descriptive, non-randomized, and mixed-methods), and MMAT provides a consistent set of core criteria applicable across these designs(Hong et al., 2018).

The appraisal was conducted in two steps. First, each study was classified into one MMAT category: Qualitative (QL), Quantitative Randomized Controlled Trial (RCT), Quantitative Non-Randomized (NRS), Quantitative Descriptive (QD), or Mixed Methods (MM). Second, all studies were assessed using the two MMAT screening questions (S1–S2), followed by five design-specific criteria (C1–C5). Each criterion was rated as Yes (Y), No (N), or Can't tell (CT) when reporting was insufficient. In line with MMAT guidance, no single numerical quality score was computed; instead, criterion-level ratings were reported for transparency.

A study was retained with the decision "Include" when it passed screening (S1 = Y; S2 = Y) and met all five design-specific criteria with ratings Y (allowing a maximum of one CT where reporting detail was limited but not deemed critical to validity), and with no N. Studies with multiple CT/N would be downgraded (e.g., include-with-caveats) or excluded; however, in this review, the final set of 30 studies that satisfied eligibility requirements and entered the qualitative synthesis also met the "Include" decision rule.

Quality appraisal using MMAT 2018 was performed for all studies included in the final qualitative synthesis (n = 30). Overall, all included studies met the screening criteria and satisfied the five design-specific MMAT criteria with no "No" ratings; therefore, all 30 studies were retained with the decision "Include". Minor reporting limitations were observed in a small number of studies (typically "Can't tell" on one criterion), mainly related to incomplete reporting of sampling/representativeness in quantitative descriptive designs or limited detail on integration procedures in mixed-methods designs; however, these did not compromise the overall eligibility or validity for inclusion under the predefined rule. The detailed MMAT ratings for each included study are presented in Table 1.

Table 1. MMAT appraisal sheet

No	Literature	Design	S1	S2	C1	C2	C3	C4	C5	Key Limitation	Decision
1	(Agboola et al., 2023)	QD	Y	Y	Y	Y	Y	CT	Y	Nonresponse handling not fully detailed	Include
2	(Almusaed et al., 2023)	QD	Y	Y	Y	Y	Y	CT	Y	Limited detail on sampling rationale	Include
3	(Axelsson et al., 2024)	QL	Y	Y	Y	Y	Y	CT	Y	Reflexivity/reporting detail limited	Include
4	(Balfaqih & Alharbi, 2022)	QD	Y	Y	Y	Y	Y	Y	Y	-	Include
5	(Binyamin et al., 2024)	QD	Y	Y	Y	Y	Y	Y	Y	-	Include
6	(Ferreira dos Santos et al., 2025)	QD	Y	Y	Y	Y	Y	CT	Y	Nonresponse bias not explicitly addressed	Include
7	(Grguric et al., 2021)	QD	Y	Y	Y	Y	Y	Y	CT	Sampling representativeness not fully stated	Include
8	(Halicka & Surel, 2022)	MM	Y	Y	Y	Y	Y	CT	Y	Integration steps briefly described	Include
9	(Huang et al., 2025)	QD	Y	Y	Y	Y	Y	Y	CT	Representativeness/setting description limited	Include
10	(Ibrahim et al., 2023)	QD	Y	Y	Y	Y	Y	Y	Y	-	Include
11	(Kim et al., 2024)	NRS	Y	Y	Y	Y	Y	CT	Y	Confounder reporting limited	Include
12	(C. Li, 2024)	QD	Y	Y	Y	Y	Y	Y	CT	Limited info on external validity	Include
13	(J. Li et al., 2021)	QD	Y	Y	Y	Y	Y	Y	Y	-	Include
14	(Y. Li et al., 2024)	QD	Y	Y	Y	Y	Y	CT	Y	Sampling/setting detail limited	Include
15	(Lin et al., 2022)	QD	Y	Y	Y	Y	Y	Y	CT	Nonresponse bias not discussed	Include
16	(S. Liu et al., 2025)	QD	Y	Y	Y	Y	Y	Y	CT	Representativeness not fully stated	Include
17	(Y. Liu & Ye, 2023)	QD	Y	Y	Y	Y	Y	CT	Y	Sampling strategy briefly described	Include
18	(Nikiforova et al., 2023)	QL	Y	Y	Y	Y	Y	CT	Y	Context/participants detail limited	Include
19	(Oh, 2024)	QD	Y	Y	Y	Y	Y	CT	Y	Instrument validity briefly reported	Include
20	(Orlowski & Loh, 2025)	QD	Y	Y	Y	Y	Y	Y	CT	Sampling detail limited	Include
21	(Pirinen et al., 2025)	QL	Y	Y	Y	Y	Y	CT	Y	Limited detail on researcher reflexivity	Include

22	(Prateepporn narong, 2025)	QL	Y	Y	Y	Y	Y	CT	Y	Limited context reporting	Include
23	(Rodrigues et al., 2022)	QD	Y	Y	Y	Y	Y	Y	CT	Nonresponse bias not explicit	Include
24	(Saura et al., 2021)	QD	Y	Y	Y	Y	Y	CT	Y	Sampling strategy briefly described	Include
25	(Schneider-Kamp & Askegaard, 2022)	QL	Y	Y	Y	Y	Y	CT	Y	Context/transfer ability briefly described	Include
26	(Seymour et al., 2024)	QL	Y	Y	Y	Y	Y	CT	Y	Limited methodological detail in parts	Include
27	(Shuwei, 2025)	QD	Y	Y	Y	Y	Y	CT	Y	Reporting detail limited on sampling	Include
28	(Su et al., 2021)	QD	Y	Y	Y	Y	Y	Y	CT	Nonresponse/response rate not explicit	Include
29	(Supangkat et al., 2024)	QD	Y	Y	Y	Y	Y	Y	CT	Limited info on representativeness	Include
30	(Weck et al., 2022)	QL	Y	Y	Y	Y	Y	CT	Y	Reflexivity/analysis transparency limited	Include

RESULTS AND DISCUSSION

After identifying, screening, and assessing the eligibility of articles using the PRISMA framework, this section discusses the synthesis results of 30 literature based on Research Questions (RQ). The following are the research synthesis results.

How does ICT contribute to the development and management of Smart Living? (Research Question 1)

Various studies show that the Internet of Things (IoT) plays a central role in supporting connected lifestyles and system automation in smart homes and cities by facilitating data collection, monitoring, and communication between smart devices (J. Li et al., 2021),(Supangkat et al., 2024),(C. Li, 2024),(Ibrahim et al., 2023),(Y. Liu & Ye, 2023). In addition, strategies based on standard evaluation frameworks such as ISO 37122 and TOE are applied to ensure that the direction of smart city development remains measurable and sustainable (Huang et al., 2025),(Balfaqih & Alharbi, 2022). On the other hand, artificial intelligence (AI) technology is widely used in household energy management systems, digital health services, strategic decision-making, and even waste management automation and renewable energy utilization (Grguric et al., 2021),(S. Liu et al., 2025),(Lin et al., 2022),(Binyamin et al., 2024),(Nikiforova et al., 2023),(Almusaed et al., 2023),(Shuwei, 2025). Several studies adopt a comprehensive strategy that not only focuses on technology but also considers social and economic dimensions to enhance quality of life and strengthen community participation in the digital ecosystem (Halicka & Surel, 2022),(Rodrigues et al., 2022),(Kim et al., 2024),(Prateeppornnarong, 2025),(Agboola et al., 2023). Amidst this complexity, data security and privacy are major concerns, which are addressed through the development of intelligent meta assistants and data analysis to detect digital threats early on (Orlowski & Loh, 2025),(Saura et al., 2021). Meanwhile, human-technology interaction is enhanced by providing intuitive control interfaces, such as hand gesture recognition and computer-based home control systems, which enable a more adaptive and personalized living experience (Su et al., 2021),(Oh, 2024),(Axelsson et al., 2024),(Seymour et al., 2024),(Pirinen et al., 2025). Demographic issues are also a focus, with technology being used to support independent living for the elderly, whether through remote healthcare services, assistive technology, or inclusive

urban design (Weck et al., 2022),(Ferreira dos Santos et al., 2025),(Schneider-Kamp & Askegaard, 2022). Finally, innovations at the hardware level, such as the development of flexible and multifunctional MXene sensors, also make a significant contribution to ICT-based energy and health monitoring systems (Y. Li et al., 2024).

What ICT-based technologies are most effective in supporting the implementation of Smart Living? (Research Question 2)

Various ICT-based technologies have proven effective in supporting the implementation of Smart Living. Internet of Things (IoT) technology dominates as the main link between smart devices and home and city automation systems, enabling real-time communication, monitoring, and efficient remote control (J. Li et al., 2021),(Supangkat et al., 2024),(C. Li, 2024),(Ibrahim et al., 2023),(Y. Liu & Ye, 2023). Meanwhile, artificial intelligence (AI) technology is essential for making strategic decisions, predictive energy management, health telematics systems, and more responsive and intelligent city management (Grguric et al., 2021),(S. Liu et al., 2025),(Lin et al., 2022),(Binyamin et al., 2024),(Nikiforova et al., 2023),(Almusaed et al., 2023),(Shuwei, 2025). In the context of energy efficiency, systems such as HEMS (Home Energy Management System), smart meters, PV (solar panels), and AMI infrastructure are used to monitor and regulate energy consumption adaptively (S. Liu et al., 2025),(Lin et al., 2022),(Binyamin et al., 2024),(Shuwei, 2025). For example, Liu et al. (Lin et al., 2022) implemented a neurocomputing-based Home Energy Management System (HEMS) that reduced energy consumption by 18% in simulated smart homes, demonstrating the practical impact of AI-powered optimization. Smart sensor technologies, such as MXene sensors and piezoresistive or biosensor-based sensors, also play a role in supporting accurate environmental and health monitoring (Shuwei, 2025),(Y. Li et al., 2024). In the health and social sectors, various assistive technologies and cross-border e-health services are being developed to support the independence of the elderly and remote care services (Grguric et al., 2021),(Kim et al., 2024),(Weck et al., 2022),(Schneider-Kamp & Askegaard, 2022). Meanwhile, technologies such as gesture-based control systems, modular interfaces, and infrared controls enhance the user experience in intuitively managing smart homes (Su et al., 2021),(Oh, 2024),(Seymour et al., 2024),(Pirinen et al., 2025). In the context of smart cities, the integration of data mining, optimization algorithms, gamification, and ICT-based participatory frameworks has been applied to manage city security, transportation, and waste in a smart and sustainable manner (Almusaed et al., 2023),(Agboola et al., 2023),(Saura et al., 2021),(Ferreira dos Santos et al., 2025),(Prateeppornnarong, 2025). Additionally, several studies have demonstrated the effectiveness of communication protocols such as SNMP and Net-SNMP, as well as parallel-distributed network architectures, in optimizing IoT system connectivity and reliability (Ibrahim et al., 2023),(Halicka & Surel, 2022),(Rodrigues et al., 2022). Equally important, several technologies rely on conceptual and evaluative frameworks such as ISO 37122, the TOE framework, and the EIS model to assess the readiness and effectiveness of Smart Living implementation in various contexts (Y. Liu & Ye, 2023),(Huang et al., 2025),(Balfaqih & Alharbi, 2022).

What kind of impact does ICT adoption have on social, economic, and environmental aspects in the context of Smart Living? (Research Question 3)

The adoption of ICT in the implementation of Smart Living has a significant impact on social, economic, and environmental aspects. Socially, various studies show an improvement in quality of life through safer and more comfortable living experiences in smart homes, as well as the presence of digital health services and assistive technologies that support the independence of the elderly, cross-border service interoperability, and improved physical and cognitive functions in the elderly population (Supangkat et al., 2024),(Grguric et al., 2021),(Halicka & Surel, 2022),(Kim et al., 2024),(Su et al., 2021), (Oh, 2024),(Weck et al., 2022),(Ferreira dos Santos et al., 2025),(Schneider-Kamp & Askegaard, 2022), while technologies such as AI and IoT also play a role in encouraging community participation and creating adaptive shared living spaces (Balfaqih & Alharbi, 2022),(Rodrigues et al., 2022),(Prateeppornnarong, 2025),(Agboola et al., 2023),(Pirinen et al., 2025). Similarly, Halicka and Surel (Halicka & Surel, 2022) presented a humanoid robot 'Rudy' case that improved elderly assistance and social interaction in Poland,

exemplifying Smart Living's social benefits and user-centered technology design. From an economic perspective, the application of ICT has proven to reduce household energy costs, create new business models, and facilitate AI-based peer-to-peer energy trading (J. Li et al., 2021),(S. Liu et al., 2025),(Lin et al., 2022),(Binyamin et al., 2024),(Nikiforova et al., 2023),(Shuwei, 2025), while also facilitating remote device management and optimizing networks (C. Li, 2024),(Ibrahim et al., 2023),(Rodrigues et al., 2022). In the environmental sector, the greatest contributions are seen in reducing energy consumption and managing urban waste (Almusaed et al., 2023),(Shuwei, 2025),(Y. Li et al., 2024), although challenges exist such as disparities in smart city development and tensions between technological control and user autonomy (Y. Liu & Ye, 2023),(Axelsson et al., 2024),(Seymour et al., 2024),(Pirinen et al., 2025). However, overall, the adoption of ICT in Smart Living contributes significantly to shaping a more inclusive, efficient, and sustainable ecosystem in multiple dimensions.

To clarify the synthesis of the results of the three research questions (RQ), all the main findings from the 30 articles reviewed are summarized in the Table 2. This table presents the contribution of ICT in Smart Living, the most effective technologies supporting implementation, and the social, economic, and environmental impacts of its application.

Table 2. Key Findings of The Research Questions

Research Question	Key Findings	Main References
RQ1. How does ICT contribute to the development and management of Smart Living?	- IoT as the backbone for automation, monitoring, and communication between devices. - AI supports energy management, digital health services, decision-making, and waste management. - Application of standard frameworks (ISO 37122, TOE) for sustainability evaluation. - Focus on socio-economic aspects (community participation, quality of life). - Data security and privacy issues are a major concern. - IoT dominates as a connector between devices and systems. - AI plays a role in energy prediction, telehealth, and smart city management.	(J. Li et al., 2021), (Y. Liu & Ye, 2023), (Grguric et al., 2021), (Shuwei, 2025), (Halicka & Surel, 2022), (Agboola et al., 2023), (Orlowski & Loh, 2025), (Saura et al., 2021)
RQ2. Which ICT technologies are most effective in supporting the implementation of Smart Living?	- HEMS, smart meters, PV, AMI for energy efficiency. - Smart sensors (MXene, biosensors, piezoresistive) for monitoring. - Assistive tech & e-health for elderly independence. - Gesture-based control and modular interfaces enhance the user experience. - Conceptual frameworks (ISO 37122, TOE, EIS) for evaluating implementation readiness.	(J. Li et al., 2021), (Balfaqih & Alharbi, 2022), (S. Liu et al., 2025), (Binyamin et al., 2024), (Shuwei, 2025), (Kim et al., 2024), (Su et al., 2021), (Pirinen et al., 2025), (Weck et al., 2022), (Schneider-Kamp & Askegaard, 2022)
RQ3. What is the impact of ICT adoption on social, economic, and environmental aspects?	- Social: improved quality of life, digital health services, assistive technology for the elderly, community participation, adaptive shared living experiences. - Economy: energy cost efficiency, new business models, and AI-based peer-to-peer energy trading.	(Supangkat et al., 2024), (Balfaqih & Alharbi, 2022), (Halicka & Surel, 2022), (Agboola et al., 2023), (Su et al., 2021), (Schneider-Kamp & Askegaard, 2022), (J. Li et al., 2021), (S. Liu et al., 2025), (Nikiforova et al., 2023), (Almusaed et al., 2023),

	- Environment: reduction in energy consumption, urban waste management, contribution to sustainability. - Challenges: access gaps, data privacy, social resistance.	(Shuwei, 2025), (Y. Li et al., 2024), (Orlowski & Loh, 2025), (Axelsson et al., 2024), (Pirinen et al., 2025)

Based on the summary in the Table 2, it can be seen that the dominance of IoT and AI technology is a common thread in almost all studies. IoT acts as the main connector between devices, while AI strengthens predictive functions, automation, and smart services in various sectors. Furthermore, the adoption of ICT in Smart Living not only improves quality of life but also promotes energy efficiency, creates new business models, and contributes to environmental sustainability. However, challenges such as the digital divide, data privacy issues, and social resistance remain obstacles that require innovative solutions in the future.

CONCLUSION

This study systematically reviewed all recent publications to examine the role of ICT in realizing Smart Living. The synthesis revealed that ICT—particularly the AI and IoT—acts as a core enabler of automation, energy optimization, digital health, and citizen participation. Supporting frameworks such as ISO 37122 and the TOE model strengthen the strategic integration of technology with sustainability and inclusiveness goals.

ICT adoption in Smart Living has produced tangible benefits across social, economic, and environmental dimensions. Socially, it improves quality of life and supports elderly independence through assistive and e-health technologies. Economically, it promotes energy efficiency and new business models, while environmentally it reduces energy consumption and waste. Despite these advantages, challenges remain regarding data privacy, access inequality, and community readiness that require continuous innovation and governance support.

Overall, this review contributes a PRISMA-guided synthesis that connects ICT mechanisms with multidimensional Smart Living outcomes. Theoretically, this SLR advances Smart Living and ICT research by consolidating fragmented findings into an integrated technology-to-impact perspective, clarifying how IoT/AI enabling mechanisms translate into Smart Living capabilities and, subsequently, multidimensional outcomes under key boundary conditions (governance standards/TOE readiness, privacy/security risk, and digital divide). The findings offer a scientific foundation for researchers, practitioners, and policymakers to design inclusive, efficient, and sustainable Smart Living ecosystems aligned with the Sustainable Development Goals (SDG 3, SDG 9, and SDG 11). Future studies are encouraged to explore quantitative meta-analyses or simulation-based evaluations to strengthen empirical evidence on Smart Living implementation.

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